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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,207	09/13/2006	Hannu L. Suominen	B121.12-0001	6699

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EXAMINER

THAI, SUSAN

ART UNIT	PAPER NUMBER
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1724

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01/05/2011

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/540,207	Applicant(s) SUOMINEN, HANNU L.	
	Examiner SUSAN THAI	Art Unit 1724	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 October 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/22/10 has been entered.

Claim Status

2. Claims 1-24 are pending.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1 and 6 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitation "...controlling the cell current by automation" (claim 1, lines 11-12 and claim 6, lines 14-16) was not described in the specification such that one skilled would know how the cell's current was controlled automatically. Automation encompasses both mechanical and electronic devices.

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5. Claims 1, 6 and 22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The newly added limitation "...the coaxial pipes defining an uninterrupted, generally cylindrical electrolysis space through which the hydrogen gas raises the flock in the separation tower along a generally linear path" is not supported by the original specification.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1 and 6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1 and 6, the limitation "...controlling the cell current by automation" (claim 1, lines 11-12 and claim 6, lines 14-16) renders the claim indefinite because it is unclear what the applicant meant by automation. Automation encompasses both mechanical and electronic devices.

Claim Rejections - 35 USC § 103

8. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

9. Claims 1, 3-8 and 10-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herbst et al. (Us 4872959) in view of Haivala (US 5022974).

Regarding **claims 1, 6 and 22**, Herbst discloses treatment of waste water using electrochemical flocculation (C1/L10-23) where water to be cleaned is passed through an electrolytic cell provided with two metal electrodes of different negativities (17 and 23) (see Fig. 1, different negativities are inherent in order for separation to occur); performing electrolysis between the two electrodes such that the more electronegative electrode is non-wearing in a cleaning process and is used for producing hydrogen gas and hydroxyl ions from water (C10/L57-66 and C11/L13-18); the less electronegative electrode is an active wearing electrode used for producing metal ions in a solution to be cleaned (C10/L12-13, the anode produces metals if metals are not added separately); controlling the cell current by automation to produce a strictly controlled electric field (C7/L20-33 where the different voltages are applied across the rod which is controlled by the voltage source and inline resistor); effecting in the cell the strictly controlled electric field a desired oxidation (abstract, a desired oxidation is inherent in order to remove the suspended particles); reduction reaction for removing one or more designated impurities from water to be cleaned (abstract and see examples I-III); feeding the mass flow from the cell to a separation tower that separates a flock and purified water (see Fig. 1 and C7/L34-50) and allowing the hydrogen gas to raise the flock in the separation tower (c8/L26-33); using coaxial pipes as electrodes, the inner electrode pipe being the more electronegative electrode, having holes (see Fig. 1, C9/L6-9 and abstract).

Herbst further discloses that the system can be periodically reversed so as to aid in the cleaning of the cathode portion (C7/L46-50). Herbst, however, does not explicitly

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disclose feeding flush water by pressure or an uninterrupted electrolysis space where the flock is raised along a generally linear path.

Haivala discloses an apparatus for the electrolytic treatment of liquids (abstract). Haivala further discloses using pressure to produce jet streams along a generally linear path from the inner electrode to the outer electrode in order to mix and flush the electrode surfaces (C3/L68-C4/L9 and C6/L23-36).

It would have been obvious to one having ordinary skill in the art at the time of the invention to replace the cleaning of the cathode by reversing of Herbst with the pressure sprays from the inner electrode to the outer electrode of Haivala because the operative area of the electrode surfaces can be effectively used (C2/L5-13).

Furthermore, the use of a known technique to improve similar devices (methods or products) in the same way is likely to be obvious. See *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1395 – 97 (2007) (see MPEP § 2143, C.).

Herbst discloses cylindrical electrodes (see Fig. 2) as well as a helical path for the flock but does not explicitly disclose that a linear path would render the apparatus inoperative.

Haivala further teaches that it is well known to have coaxial electrodes defining an uninterrupted generally linear path (see Fig. 1-4 and c6/L28-36).

It would have been obvious to one having ordinary skill in the art at the time of the invention to replace the helical path of Herbst with the annular path of Haivala because the change in form or shape, without any new or unexpected results, is an

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obvious engineering design. See *In re Dailey*, 149 USPQ 47 (CCPA 1976) (see MPEP § 2144.04).

Furthermore, regarding claim 6, Haivala further discloses that the flow velocity of the waste water should be below that of the medium and that a pump is used to introduce the waste water and medium through the inner electrode (c4/L64-c5/L44 and c6/L28-36).

Regarding **claim 3**, modified Herbst discloses all the limitations as set forth above and Herbst further discloses where the waste water is from sewage treatment facilities, streams or the like (C1/L15-23).

Regarding **claim 4**, modified Herbst discloses all the limitations as set forth above and Herbst further discloses where the waste water to be cleaned could be double treated (C11/L36-42). Although Herbst, does not explicitly disclose two electrolytic cells, it would have been obvious to one of ordinary skill in the art to have two electrolytic cells for double treating the water. The mere duplication of parts, without any new or unexpected results, is within the ambit of one of ordinary skill in the art. See *In re Harza*, 124 USPQ 378 (CCPA 1960) (see MPEP § 2144.04).

Regarding **claims 5, 7, 12-14 and 23-24**, modified Herbst discloses all the limitations as set forth above and Herbst further discloses the outermost electrode being made of iron or aluminum (see examples I-II) and are readily replaceable (abstract).

Regarding **claim 8**, modified Herbst discloses all the limitations as set forth above and Herbst further discloses that the outer electrode pipe (23) terminates prior to a waste water inlet (11) (see Fig. 1).

Although Herbst further discloses that the inner pipe (17) continues to the water inlet (11), Herbst does not explicitly disclose the inner pipe continuing past the water inlet by way of a valve to a wash water pump.

Haivala further discloses the water pump (14) connected to the anode through valve (15) (see Fig. 5 and C6/L28-36).

It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the inner pipe of Herbst by extending the pipe past the water inlet by way of a valve to a wash water pump of Haivala because the flow can be controlled (C4/L56-58).

Regarding **claims 10 and 15-16**, modified Herbst discloses all the limitations as set forth above and Herbst further discloses the use of stainless steel as the inner electrode and iron as the outer electrode (see examples I-III and C9/L27-31 where different metals are used for the electrodes) and an insulating housing tube (C6/L67-68).

Regarding **claims 11 and 17-20**, modified Herbst discloses all the limitations as set forth above and Herbst further discloses that inner and outer electrode pipes are locked concentrically to each other by means of end caps (30) that link to threads (25, 26) which surround the ends of the inner electrode pipe and inside which are retained the ends of the outer electrode pipe (see Fig. 1, where the threads are considered the unscrewable portion of the endcap).

Regarding **claim 21**, modified Herbst discloses all the limitations as set forth above and Herbst further discloses the removal of salts (abstract) and that it is well

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known that treatments of water includes streams, or the like (C1/L15-24, where streams includes rivers and rivers are natural watercourses that flow towards the sea thus the stream is considered sea water).

10. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Herbst et al. (Us 4872959) in view of Haivala (US 5022974) as applied to claim 1 above, as evidenced by Till et al. ("Fe(0)-supported Autotrophic Denitrification").

Regarding **claim 2**, modified Herbst discloses all the limitations as set forth above.

Herbst, however, does not explicitly disclose the removal of nitrogen, using hydrogen ions for producing ammonium ions which escape upon coprecipitating with iron hydroxide precipitate, the precipitate rising along with the hydrogen gas in the form of flock to the surface of clean water, iron is oxidized and ammonium or nitrate nitrogen is reduced as: $6\text{Fe} + 2\text{H}^+ + 2\text{NO}_3 \leftrightarrow 6\text{FeO}\downarrow + \text{N}_2\uparrow + \text{H}_2\uparrow$ whereby the result is denitrification as nitrogen escapes in the form of nitrogen gas.

Although Herbst does not explicitly disclose denitrification, the use of a known technique to improve similar devices (methods or products) in the same way is likely to be obvious. See *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1395 – 97 (2007) (see MPEP § 2143, C.). Applying a known technique to a known device (method or product) ready for improvement to yield predictable results is likely to be obvious. See *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1395 – 97 (2007) (see MPEP § 2143, D.). Denitrification using cathodic hydrogen and iron is well known as evidenced by Till (abstract, see equations 1-4).

11. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Herbst et al. (Us 4872959) in view of Haivala (US 5022974) as applied to claim 8 above, as further evidenced by Suominem (US 5888359).

Regarding **claim 9**, modified Herbst discloses all the limitations as set forth above and Haivala further discloses that the flow of the inlet is controlled by the valve (C4/L56-58) and Herbst further discloses an outlet (see Fig. 1) adapted to be opened for discharging precipitate and wash water from the electrolysis space.

Although Herbst, does not explicitly disclose that the outlet duct has a valve connected, it would have been obvious to one of ordinary skill in the art at the time of the invention to add a valve like that of the inlet to the outlet duct (as evidenced by Suominem, see Fig. 1) because it controls the flow of the solution. The mere duplication of parts, without any new or unexpected results, is within the ambit of one of ordinary skill in the art. See *In re Harza*, 124 USPQ 378 (CCPA 1960) (see MPEP § 2144.04).

12. Claims 11 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herbst et al. (Us 4872959) in view of Haivala (US 5022974) as applied to claim 8 above, as further evidenced by King (US 3972800).

Regarding **claims 11 and 17-20**, assuming that the applicant meant a separate unscrewable portion containing the threads, modified Herbst discloses all the limitations as set forth above and Herbst further discloses that inner and outer electrode pipes are locked concentrically to each other by means of end caps (30) that link to threads (25, 26) which surround the ends of the inner electrode pipe and inside which are retained the ends of the outer electrode pipe (see Fig. 1).

Herbst, however, does not explicitly disclose a separate unscrewable portion containing the threads.

It is well known in the art that the end cap can be placed directly or indirectly onto the electrodes (as evidenced by Herbst, see Fig. 1, or King, see Figs. 1-4 where the threads are on an extended portion separate from the electrodes). The change in configuration of the threads, whether directly or indirectly contacting the electrodes, is obvious absent persuasive evidence that the particular configuration is significant. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Response to Arguments

13. Applicant's arguments filed 9/29/10 have been fully considered but they are not persuasive. Applicant argues that the references cited do not teach or suggest feeding flush water intermittently through the inner electrode pipe to produce flush water sprays through the holes against the inner surface of the outer electrode pipe. The examiner respectfully disagrees. Herbst discloses periodically cleaning the electrode by reversing (C7/L46-50). The examiner relied upon Haivala to teach that it is well known in the art to spray from the inner electrode holes to the outer electrode in order to clean the surface (C3/L68-C4/L9 and C6/L23-36). Replacing one cleaning technique with another is obvious to one of ordinary skill in the art absent unexpected results. Furthermore, the use of a known technique to improve similar devices (methods or products) in the same way is likely to be obvious. See *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1395 – 97 (2007) (see MPEP § 2143, C.).

Applicant further argues Herbst teaches a different type of system since a helical path is used. The examiner would like to emphasize that Herbst does not disclose that a helical path is preferred over a linear path and also does not explicitly disclose that a linear path would render the apparatus inoperative. Applicant further argues that Herbst does not teach or suggest two concentrically or coaxially arranged pipes defining an uninterrupted generally cylindrical electrolysis space. The examiner would like to emphasize that Herbst discloses cylindrical electrodes that are coaxially arranged (see Fig. 2). Haivala further teaches that it is well known to have coaxial electrodes defining an uninterrupted generally linear path (see Fig. 1-4 and c6/L28-36). It would have been obvious to one having ordinary skill in the art at the time of the invention to replace the helical path of Herbst with the annular path of Haivala because the change in form or shape, without any new or unexpected results, is an obvious engineering design. See *In re Dailey*, 149 USPQ 47 (CCPA 1976) (see MPEP § 2144.04).

Applicant argues that Haivala does not teach or suggest that hydrogen raises flock in a generally cylindrical space along a generally linear path. The examiner has relied upon Herbst to teach that hydrogen raises flock (c8/L26-33). Haivala was relied upon to teach the generally linear path as disclosed above.

Applicant argues that Haivala teaches a parallel plate system where both electrodes have holes in them for injecting agitation liquid. The applicant misunderstood the rejection in question. The examiner relied upon the embodiment of Haivala where the holes are on the inner electrode and the inner and outer electrodes form an annular space between (c6/L28-36).

Applicant further argues that the references fail to teach feeding the flush water at a pressure higher than a pressure at which the pump introduces the mass flow. The examiner has now relied upon Haivala to teach this aspect.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SUSAN THAI whose telephone number is (571)270-1487. The examiner can normally be reached on Monday-Thursday, 6:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art Unit 1753

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/SUSAN THAI/

Examiner, Art Unit 1724